CLAIMS

1. (Previously presented) A method of reconstructing tomography images comprising:

acquiring data on the geometric coordinates of detection of radiation from individual nuclear events;

separately distributing a weight of each of the individual nuclear events along a line of flight associated with the event determined from the acquired data on the geometric coordinates of detection of the individual event; and

iteratively reconstructing the image based on the distributed weights.

2. (Currently amended) A method according to claim 1 wherein the weights are distributed in voxels along the line of flight and wherein the weight of a particular event is distributed based on the probability that a nuclear event occurred in particular voxels.

3. (Previously presented) A method according to claim 1 wherein the line of flight of an event is determined based on the position at which the radiation from the nuclear event was detected on a detector and the acceptance direction of a collimator through which the detector receives radiation associated with the events.

4. (Previously Presented) A method according to claim 1 wherein the line of flight of an event is determined by the position on a detector on which the event is detected and the location of the source of radiation associated with the event.

5. (Previously Presented) A method according to claim 1 wherein the line of flight associated with an event is determined by detection of two coincident photons.

6. (Previously Presented) A method according to claim 1 wherein iteratively reconstructing the image comprises applying an iterative expectation maximization (EM) method on the data in subsets.

7. (Previously presented) A method according to claim 6 wherein the individual detected nuclear events form the separate sub-sets.

8. (Previously Presented) A method according to claim 6 wherein the sub-sets are formed based on the time of acquisition of events.

9. (Original) A method according to claim 6 wherein the sub-sets are formed from unrelated events.

10. (Currently Amended) A method of reconstructing tomography images comprising:

acquiring data on the geometric coordinates of detection of radiation from individual nuclear events; and

applying an iterative expectation maximization (EM) method on the data in sub-sets which are formed based on the time of acquisition of the data on the geometric coordinates of detection of the radiation from the events,

wherein the subsets consist of data having less than a 180 degree view angle.

11. (Cancelled)

12. (Previously Presented) A method according to claim 6 or claim 10 wherein iterations of the EM method are performed prior to the acquisition of data having a 180 degree angle of view.

13. (Previously Presented) A method according to claim 6 or claim 10 wherein iterations are commenced on receipt of the first detected event.

14. (Previously Presented) A method according to claim 6 or claim 10 comprising displaying an evolving image based on successive iterations of the iterative EM method on a display device.

15. (Previously Presented) A method according to claim 6 or claim 10 and including determining if a study should be terminated based on the image quality of an image after an iteration.

16. (Previously Presented) A method according to claim 6 or claim 10 wherein intermediate images are filtered with a smoothing filter between iterations of the EM method.

17. (Previously Presented) A method according to claim 6 or claim 10 wherein intermediate images are filtered with a noise reducing filter between iterations of the EM method.

18. (Previously Presented) A method according to claim 6 or claim 10 wherein data is reused in subsequent iterations of the EM algorithm.

19. (Previously Presented) A method according to claim 1 or claim 10 wherein the image is a three dimensional image.

20. (Previously Presented) A method according to claim 1 or claim 10 wherein the iterative method comprises reconstructing from the events without forming two dimensional data sets.

21. (Previously Presented) A method according to claim 1 or claim 10 wherein the iterative method comprises reconstructing from the events without forming sinograms for slices of the three dimensional image.

22. (Previously Presented) A method of reconstructing tomography images comprising:

acquiring data on the geometric coordinates of detection of radiation generated by individual nuclear events; and

iteratively reconstructing a three-dimensional image from the unbinned individual nuclear events.

23. (Original) A method according to claim 22 wherein reconstructing the image comprises utilizing an expectation maximization (EM) method acting on individual unbinned events.

24. (Previously Presented) A method according to claims 1, 10 or 22 wherein the nuclear events are nuclear emission events and the images are emission tomography images.

25. (Previously presented) A method according to claims 1, 10 or 22 wherein the nuclear events are positron decay events and wherein the images are PET images.

26. (Previously presented) A method according to claims 1, 10 or 22 wherein the nuclear events are represented by photons which have passed through a subject and wherein the images are transmission tomography images.

27. (Previously presented) A method according to claim 26 wherein the images are nuclear transmission tomographic images.

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28. (Cancelled)

29. (Previously presented) A method according to claim 1, 10 or 22 wherein the line of flight associated with the nuclear events form a fan beam.

30. (Previously Presented) A method according claim 1, 10 or 22 wherein the lines of flight associated with the events form a cone beam.

31. (Original) A method of reconstructing positron emission tomography (PET) images comprising:

acquiring data on the geometric coordinates of detection of individual positron emission tomography events utilizing a plurality of spatially continuous area detectors; and

reconstructing the image utilizing an expectation maximization (EM) method acting on individual unbinned events.

32. (Previously Presented) A method according to claim 31 wherein the spatially continuous detectors are substantially planar detectors.

33. (Original) A method of reconstructing positron emission tomography (PET) images comprising:

acquiring data on the geometric coordinates of detection of individual positron emission tomography events utilizing a plurality of substantially planar area detectors; and

reconstructing the image utilizing an expectation maximization (EM) method acting on individual unbinned events.

34. (Original) A method according to any of claims 31-33 wherein the plurality of detectors consists of two such detectors.

35. (Previously Presented) A method according to any of claims 31-33 wherein the images are three dimensional images.